A UNIT FOR TRANSFERRING GROUPS OF ROLLS TO BE WRAPPED WITHIN A FILM, FROM AN INTERMEDIATE STATION TO SUBSEQUENT STATIONS

TECHNICAL FIELD

The present invention relates to a system for dragging groups of rolls of web material away from an intermediate station, in which each group is wrapped laterally with a film, and for moving the groups to subsequent stations, arranged in a line, in which the wrapping of the film around the group is completed by folding and heat-sealing the film.

BACKGROUND OF THE INVENTION

Known packaging machines are aimed at arranging paper rolls in groups of one or more layers, with each layer including rows of rolls situated side by side, and with each row including one or more rolls.

In case of two or more rolls, they are coaxial and disposed end-to-end.

Then, the packaging machines wrap each group within a film, or a sheet of material which stabilizes the arrangement of the group and encloses it with in a tight seal, so as to protect it during its piling, transporting to the shop and during the transport to the user's local.

In order to perform the above mentioned operations, the packaging machines include:

- a plurality of channels conveying the rolls toward a station where the group of rolls is formed;
- an elevator, running between vertical walls containing the group laterally, and moving between two extreme positions: lowered, in which the elevator defines the bottom of said group forming station, and raised, in which the group is placed in an intermediate station;
- means for positioning a film transversely to the vertical walls, so that the film, whose dimensions allow to wrap completely the group, can be struck by the group

of rolls carried by the elevator during its upward stroke toward the raised position;

- an abutment situated transversely, so as to act as a stop for the group of rolls transferred to the intermediate station by the elevator;
- a pronged conveyor, which is operated stepwise, and whose lower run is arranged transversely in a position in which it runs through the intermediate station, the conveyor prongs defining a series of seats, with the seats of the lower run receiving respective groups of rolls, which are dragged thereby while resting on a stationary running surface situated below; the conveyor is operated in such a way as to locate one seat of the lower run in the intermediate station;
- transverse folding means, acting in the intermediate station in step relation with the elevator downward stroke, to fold the lower edges of the film inserting them under the group of rolls, to wrap the group laterally;
- other folding means and sealing means, connected to said conveyor, for completing the wrapping of the portion of the film around the group, more precisely, at the heads, and for stabilizing the wrapping.

The conveyors used so far are complicated, require frequent maintenance operations and long stops during size change operation, mainly when group length is to be changed.

In fact, the conveyors are driven by four chains operated synchronously and extending along relative vertical planes. The chains are arranged in two sets, with the chains of one set situated one beside another.

Extensions for pulling regularly spaced out carriages are set in engagement with two chains of the two sets. The carriages support stems, on which the dragging prongs are mounted.

Other extensions are set in engagement with the other two chains of the second set for pulling regularly spaced out

carriages, which support stems, on which the dragging prongs are mounted.

The carriages have opposite heads, equipped laterally with ball bearings, which move in corresponding guides defining an endless loop path.

The extensions for dragging the carriages are made integral with the lower part of the carriages heads.

The dragging prongs are mounted on each carriage, suitably spaced apart.

The number of dragging prongs on each carriage changes in relation to the number of rolls to be packaged in each group.

Usually, in order to obtain a balanced situation while dragging, at least a pair of prongs are necessary for each carriage for groups made of e.g. two rolls, arranged side by side.

The change of the so-called size of a group of rolls can be due to:

- change of length, measured considering the overall dimension of the rolls arranged end-to-end;
- change of width, measured crosswise to the dimension previously mentioned;
- change of height.

When the packages size is to be changed because of the change of length, usually it is necessary to substitute all the carriages of the line with other carriages suitable for the new production cycle.

In order to do so, it is necessary to remove a suitable removable element of the guide, and to operate the chains stepwise and with low speed, so as to release and remove, one by one, the carriages to be substituted and mount the carriages adapted to the new product dimensions.

The operations needed for size changeover require a lot of time, as well as suitably trained personnel.

Moreover, it is necessary to store additional sets of carriages in magazines, which results in bigger number of

mechanical parts and consequently, increases the costs and space required for a magazine.

When the packages size is to be changed because of the change of width, it is necessary to stop the conveyor and stagger more or less one pair of chains with respect to the other until the selected width of the seats receiving the packages, is obtained.

It is also to be pointed out that there is an upper limit for the width, which is defined by the length of the step between two subsequent carriages mounted on the same pair of chains.

The distance between the lower run of the chains of the conveyor and the motionless running plane defines an upper limit for the packages height; actually, the upper stop is situated underneath the chains.

The change of this just mentioned distance could cause considerable constructive complications, such as the necessity to adjust vertically the conveyor positioning.

SUMMARY OF THE INVENTION

The object of the present invention is to propose a working unit, which can receive groups wrapped laterally with a film and situated in an intermediate station, and transfer them toward the subsequent folding and sealing stations without the help of dragging prongs and running surface, all independently from the size of the groups of rolls being moved.

Another object of the present invention is to propose a unit, in which size changeover operation is simple, rapid and does not require the use of manpower.

A further object of the present invention is to propose a unit which not only fulfills the above objects, but also increases the production rate with respect to known machines.

A still further object of the invention is to obtain what above without tearing and/or deforming the rolls forming groups, nor the article wound in rolls.

The above mentioned objects are obtained, in accordance with the contents of the claims, by means of a unit for transferring groups of rolls to be wrapped within a film, from an intermediate station to subsequent stations, including means for feeding said intermediate station with groups of rolls, partially wrapped with a film so that longitudinal edges of the film are overlapped, said intermediate station being defined by:

first horizontal means supporting an ensemble formed by the group and the film;

second horizontal means situated above said first supporting means for constraining said ensemble supported by said first supporting means;

third vertical means, for constraining said ensemble laterally;

an outlet side, for allowing said ensemble to exit said intermediate station;

said unit further including:

pusher means operated when said ensemble is located in said intermediate station, so as to cause said third means to strike laterally said ensemble and to convey it toward the outlet of said intermediate station;

at least one first conveyor;

one horizontal active run of said first conveyor, coplanar with said first supporting means and situated after said outlet of said intermediate station, said horizontal active run being operated in time relation with said pusher means and with speed correlated with the speed of said pusher means;

said active run being aimed at receiving said ensemble, pushed out from said intermediate station by said pusher means, and sending said ensemble toward subsequent stations.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristic features of the present invention will be pointed out in the following description of a preferred, but not unique embodiment, with reference to the enclosed drawings, in which:

- Figures 1, 2, 3 and 4 are schematic views of some operation steps of a first embodiment of the proposed unit;
- Figure 5 is a schematic view of another embodiment of the present invention;
- Figures 6 and 7 are schematic, respectively front and top views of a different embodiment of the proposed unit;
- Figures 8, 9, 10 are schematic views of still different embodiments of the proposed unit.

DETAILED DESCRITPION OF THE INVENTION

With reference to Figures 1 to 4, reference numeral 1 indicates an elevator moving vertically, in known and not shown way, between a lowered position A and a raised position B.

The plate 1 in lowered position forms the bottom of a station S, in which the groups P of rolls R (of e.g. paper) are formed, arranged in one layer S1 (Figures 1 - 4) or in more layers (e.g. two layers S, S2: Figure 8), with each layer including more rows F of rolls R.

Each row includes one or more rolls and the rolls are coaxial and arranged end-to-end.

The techniques for forming the group P are not described, since well known to those skilled in the art.

The path covered by the elevator is delimited laterally by two lower lateral guides 2A, 2B, facing each other and perpendicular to the figure plane, and by two upper lateral guides 3A, 3B, facing each other, situated above the previous ones.

The distance between the lower lateral guides 2A, 2B and the upper lateral guides 3A, 3B define a free space 4.

In the space 4, suitable means (not shown, as they are known) dispose a film 6, or sheet, whose dimensions is sufficient to wrap a group P, when the elevator 1 is in the lowered position A and a group P of rolls is being formed.

Stationary vertical bars 7 are situated above the upper outer lateral guide 3A (the one on the left with reference to the Figures). The distance between the stationary vertical bars 7 and the upper lateral guide 3A defines a free space, in which a first transversal folding member 8A works in cooperation with a second folding member 8B, facing the first one.

A transversal stop 9, whose height is adjustable in a known and not shown way, is situated over the folding members.

The ensemble C, formed by the group P and the film 6, strikes against the stop 9 when the elevator is in the raised position B.

The stop 9 together with the elevator 1 in the raised position B, the folding members 8A, 8B and the stationary vertical bars 7, define an intermediate station W, in which the group P is partially wrapped within the film 6, i.e. the station receiving the ensemble C.

In the intermediate station W, pushing means 10 act transversely (forward stroke in direction M1), when the elevator 1 reaches the raised position B, in order to push the side facing the stationary bars 7 of the ensemble C lying on the elevator, so as to send the group P and the film 6 toward at least one conveyor 50, which will be described hereinbelow.

The pushing means 10 are preferably carried by operating endless means (not shown), which set the pushing means to move along a horizontal movement passing through the station W (position N1, N2 of Figures 1 and 4), a vertical upward movement, during which the group P is released at the end of the station W (position N3) and finally a return stroke, in direction M2, e.g. again horizontal: position N4.

The conveyor 50, situated downstream of the station W with respect to the forward direction M1, includes e.g. an endless belt 51, whose upper, or active, run 51A is coplanar with the upper surface 1A of the elevator 1, when the latter is in the raised position B (Figure 3).

Instead of only one endless belt, two or more belts can be used, arranged side by side, or a series of endless belts, arranged side by side, so as to define an active run 51A parallel to the direction M1.

Instead of only one endless belt 51, two or more endless belts can be used, with the upper runs thereof arranged one after another without any gap, to define the active run; also in this case, those skilled in the art can use series of endless belts or strip-like belts, arranged one after another.

The active run 51A is driven stepwise in the direction X, parallel to the forward direction M1 of the pushers 10, with a medium speed value linked to the speed of the pushers 10 during the above forward stroke. Driving means for the endless belt 51 are known to those skilled in the art, therefore, they have not been illustrated.

In a known way, the group P of rolls R is formed on the elevator 1 situated in the station S, and the film 6 is disposed above and crosswise to the station, as known to those skilled in the art (Figure 1).

While the elevator 1 goes up, the group P strikes the film 6, which takes the shape of an overturned "U" around the group P, due to the presence of the upper guides 3A, 3B; the folding members 8A, 8B are in open position (Figure 2).

Figure 3 shows the elevator in the raised position B, coplanar with the active run 51A; in this position the group P together with the film 6, i.e. the ensemble C, is gripped between the elevator 1 and the transversal stop 9, and, on its side opposite to the run 51A, the ensemble C strikes vertically against the stationary vertical bars 7.

The definition of the configuration shown in Figure 3 results in the following operations, performed in reciprocal step relation:

- the pushers 10 goes in abutment on the ensemble C;
- the folding members 8A, 8B move close to each other and consequently, fold the longitudinal edges 6A, 6B, extending along the group length, under the group and overlap them;
- the elevator goes down;
- the active run 51A translates in direction X with the speed correlated with the speed of the pushers 10.

Consequently, the ensemble C is pushed by the pushers 10 in direction M1, its upper part is constrained by the stop 9 and its lower part is supported first by the elevator, then by the folding members 8A, 8B and finally by the active run 51A.

Firstly, the active run 51A not only support the ensemble C but also moves it together with the pushers 10. Then, the active run 51A fully replaces the pushers 10 and moves the ensemble C alone (Figures 4, 1, 2).

Advantageously, the transversal stop 9 extends above the initial part of the run 51A.

The enclosed figures do not show, as they are known, means for folding the film 6 against the heads of the group and for stabilizing, by heat-welding, the flaps obtained by folding.

Means 20 for heat-welding the longitudinal, tucked in edges 6A, 6B have been shown only generically, since they are known.

According to the example shown in the enclosed Figures, after having performed their action, the pushers 10 are raised, withdrawn (positions N3, N4: Figure 2) and lowered again (Figure 3).

Those skilled in the art can use pushers operated in different way (e.g. alternative), or technically equivalent means, i.e. means fulfilling the same functions as the pushers.

As it has been already said, the average speed of the active run 51A (direction X) is correlated with the speed of the

pushers 10 (direction M1), and it can be equal thereto (in this case there are no considerable longitudinal stresses, i.e. in direction X, to the group), lower or higher, which results in adjustment of the tensioning of the rolls of the group.

The depth dimension, i.e. the dimension perpendicular with respect to the drawings, is at least equal to the maximum possible length size of the group P: consequently, if the length of the group changes, it is not necessary to adjust the proposed unit in any way.

In other words, it is not necessary to adjust the proposed unit because of the size change, due to the change of the groups length.

The change of the group width (dimension measured along the direction X) causes only the change of the step length, i.e. the path covered by the active run 51A between two subsequent stops.

The height of the transversal stop 9 must be adjusted when the height of the group is changed.

According to Figures 1 - 4, the run 51A is driven stepwise: it can be also driven continuously, which would cause spacing out of the groups.

Figure 5 shows another embodiment of the proposed solution. According to this second embodiment, a second conveyor 150 (which can be of any type, e.g. like the first conveyor 50), including an endless belt 151, is situated above the first belt 51.

The lower run 151A of the second conveyor faces the active run 51A and the speeds of the two runs are correlated with each other, e.g. preferably the same.

Thus, the ensembles C are firmly kept between the above runs 51A, 151A , which makes the ensembles C stable and allows to adjust the vertical pressure, the runs exert thereon.

According to another embodiment, shown in Figures 6 and 7, there are two more conveyors, third 350 and fourth 450,

respectively, which include respective vertical endless belts 351, 451.

The inner arms 351A, 451A of the third conveyor 350 and fourth conveyor 450 face each other and touch the heads CA of each ensemble C.

The speeds of the inner arms 351A, 451A are correlated with each other (e.g. equal to each other) and with the speed of the runs 51A, 151A, preferable equal thereto.

The embodiment shown in Figures 6 and 7 avoids shifts of the group along its length direction and allows to adjust the pressure on the ensemble C in the length direction.

When the groups P include more layers, arranged one over another, e.g. two layers S1, S2 (Figure 8), each of the third and fourth conveyors 350, 450 can be formed by two separated conveyors, arranged one above the other and acting on a corresponding layer S1, S2 indicated with 550A, 550B in Figure 8.

In Figure 9, the group P, situated between two stops 95, 96, is partially wrapped with the film 6, whose edges 6A, 6B are folded under the group.

The group P - film 6 ensemble can be formed in any way, different from the ones described above.

The pusher 10 pushes the ensemble downstream, where it is taken over by at least one endless belt 51 (Figure 9 re-proposes the solution of Figure 5).

According to the embodiment of Figure 10, the stops 95, 96 are substituted with horizontal runs of a pair of endless belts 195, 196.

The horizontal runs of the endless belts 195, 196 are operated with the speed correlated with the speed of the pusher 10. In this case, the overlapping longitudinal edges 6A, 6B are arranged vertical, on the side of the group being pushed by the pusher.

Consequently, in the intermediate station W, the group P is partially wrapped with the film 6, which can be obtained by

technical-functional solution shown in Figures 1 - 5, or in any other way as shown in Figures 9 and 10.

The concept of the proposed invention lies in the combination of the pusher means 10 (or equivalent means, e.g. a conveyor) situated in the station W and acting in reciprocal combination with at least one endless belt 51, which receives the group partially or totally wrapped within the film.

This allows to simplify the transferring of the groups from the station W to the subsequent stations, in which the wrapping with the film is completed, and allows to adjust the proposed unit to the changed size in an easy, rapid and automatic way.

Actually, in order to perform the above operation, it is enough to adjust the position of the transversal stop or the mutual position of the axes of the shafts, about which the endless belts turn; thus it is not necessary to substitute any parts, as it is required in known machines.

The proposed unit allows to adjust the stresses on the ensemble C, and subsequently, on the finished group; this avoids lacerations and/or tears of the material wound in rolls as well as of the wrapping film 6.

It is understood that what above, has been described as a pure, unlimited example, therefore, possible variants of the invention remain within the protective scope of the present technical solution, as described above and claimed hereinafter.